AN ENDEMIC SOPHORA FROM RUMANIA

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With plates 123 and 124 and one text figure

ONE of the most interesting endemics of the Balkan peninsula is the *Sophora* discovered at Babadag by J. Prodan.[1] Through the kindness of Dr. C. Georgescu of the Școală Politechnică at Bucarest I was able to visit this locality on September 4, 1934 and collected abundant fruiting material. Subsequent comparison with Asiatic material of *Sophora alopecuroides* L. in the herbaria of the Royal Botanic Garden at Kew and of the Arnold Arboretum has convinced me that the Rumanian plant deserves to be described as a distinct species and I take pleasure in naming it after its discoverer.

Sophora Prodanii, sp. nov.

Herba suffruticosa, 5–7 dm. alta. Folia 5–10 cm. longa, imparipinnata; foliola 19–25, oblongo-elliptica, 12 mm. longa, 7 mm. lata, membranacea, supra glabra, subtus pilos sparsos appressos gerentia. Racemus densus. Flores ignoti, non visi. Legumen 5–7 cm. longum, glabrescens; semina 3–7, luteo-fusca, 5 mm. longa.

Known only from a single hilltop near Babadag, Rumania.

Șeremet, Babadag, Rumania, *Edgar Anderson* no. 85 (type), Sept. 4, 1934 (specimens deposited in the herbaria of the Arnold Arboretum, Royal Botanic Garden Kew and British Museum of Natural History).

An erect suffrutescent herb from an underground rootstalk; stems, erect, 5–7 dm. tall, slender, with ascending simple branches, subterete, dark green with fine, rather scattered, short, appressed hairs. Leaves alternate, imparipinnate, 5–10 cm. long; stipules wanting; leaflets 19–25, elliptic oblong to oblanceolate, up to 12 mm. long and 7 mm. wide when well developed, dark green, rather thin, becoming brittle when dry; apex rounded with a mucronate tip. Leaflets glabrous above, pubescent below with very scattered fine short appressed hairs; margin entire and somewhat revolute; midrib evident but veins weak and evident only beneath; petiolule about 1 mm. long. Inflorescence terminal, racemose, dense, sub-erect. Flowers not seen. Fruit terete, torose, wingless, indistinctly ribbed, indehiscent or tardily dehiscent,

[1] Mag. Bot. Lapok. **11**: 231, 235 (1912).

with sparse appressed hairs; pedicels in fruit 2–4 mm. long, strictly ascending. Seeds yellowish brown, 5 mm. long.

The species is of very restricted distribution. It is at present known only from this one locality, the summit of a small hill near the ancient town of Babadag. It occurs over a space of several acres in the edge of the forest and persists as a weed in an adjoining field. Prodan (loc. cit.) in his account of the plant from Babadag identified it with *S. alopecuroides* L. but pointed out that it was much more nearly glabrous.

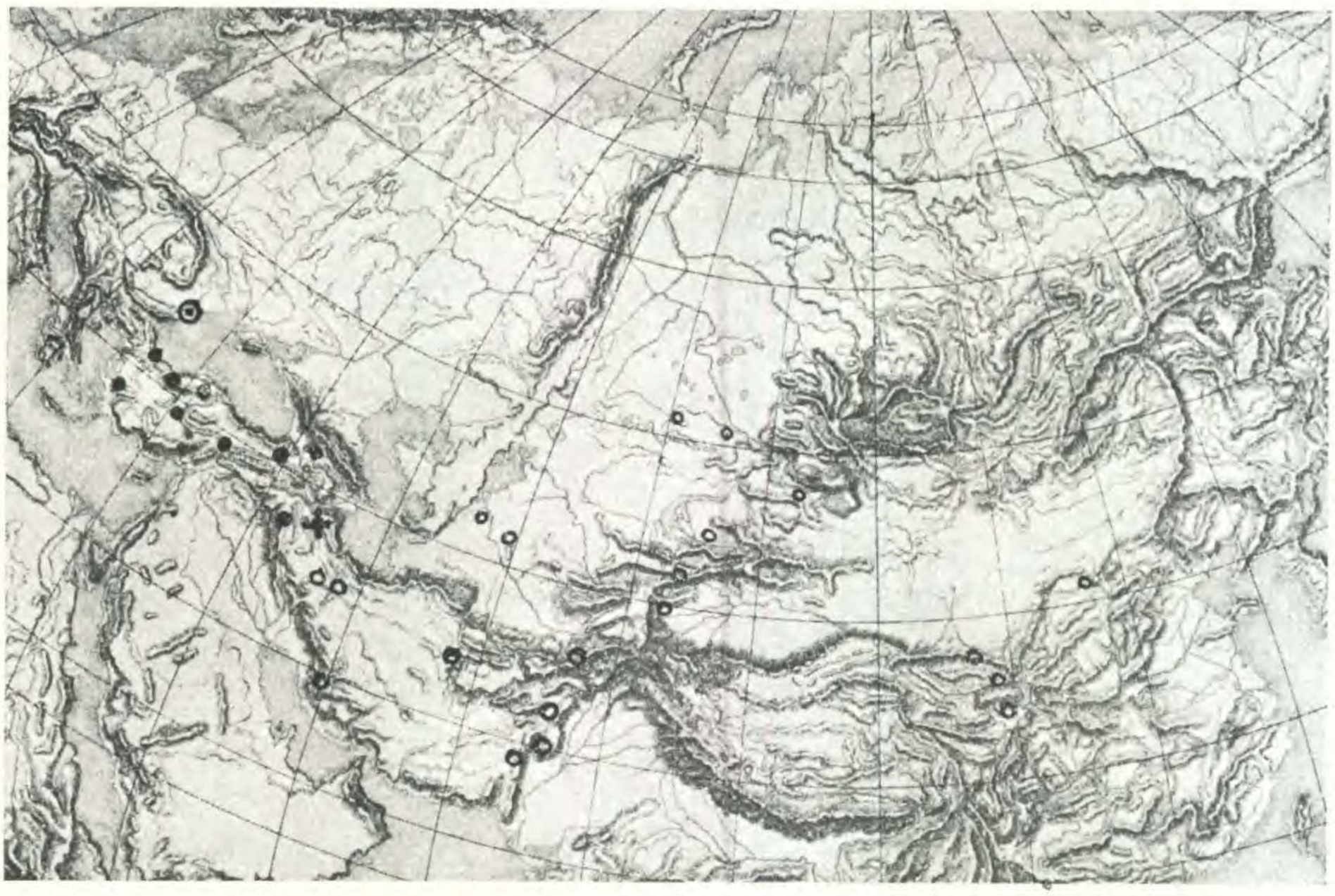

Fig. 1. Distribution of Sophora alopecuroides and its Close Relatives

◎ = *Sophora Prodanii*
● = *S. alopecuroides*
○ = *S. alopecuroides* var. *tomentosa*
✤ = Intermediate form collected by Gilliat Smith

Sophora alopecuroides, sensu latiore, is a wide-spread species (see Fig. 1), extending from central Asia to northern Asia Minor and the vicinity of Constantinople (Istambul). From central Asia to Asia Minor there is a progressive transition in pubescence, leaf size, and leaf texture. If only the two ends of the series existed they could easily be maintained as two separate species, a small-leaved species with appressed silky hairs from northern Asia Minor and a coarser species with spreading tomen-

tose pubescence from Central Asia. As early as 1850 Spach[1] had proposed the name *S. Jauberti* for the *Sophora* from Asia Minor and in 1894 Freyn and Sintenis[2] described *Goebelia reticulata* from northern Asia Minor, a name which was later transferred to *Sophora* by Hayek.[3] Aznavour[4] went so far as to advance the plants collected by him in the suburbs of Constantinople to the status of a variety, *Buxbaumii* of *Goebelia reticulata*.

It is certainly true that there is marked geographical differentiation in *S. alopecuroides*, sensu latiore, but when a large series of specimens is examined, these local and regional differences are found to intergrade. Particularly interesting are two collections made by Mr. B. Gilliat Smith (nos. 1904 and 1714) in the neighborhood of Tabriz, Persia, which can be assigned with certainty neither to the form from Central Asia nor to that from Asia Minor. Since Tabriz is in the region where these two forms come together, it seems best to follow Boissier[5] and Bornmüller[6] and treat the *Sophora* from Asia Minor as *S. alopecuroides* L. and that from Central Asia as *S. alopecuroides* L. var. *tomentosa* (Boiss.) Bornm. Further study will undoubtedly permit the separation of other geographical varieties. The specimens I have seen from N. W. China which have been referred to *S. alopecuroides* are certainly different from those collected in Afghanistan and Persia.

Taken as a whole, *S. alopecuroides* and *S. Prodanii* present a graded series in size and texture of leaflet, pubescence and color (Table I).

TABLE I. COMPARISON OF LEAF CHARACTERS

	S. Prodanii	*S. alopecuroides*	*S. alopecuroides* var. *tomentosa*
leaf texture	brittle when dry	tenuous	coriaceous
upper side of leaflets	glabrous	appressed silky pubescence	tomentose pubescence
under side of leaflets	scattered appressed hairs	appressed silky pubescence	spreading tomentose pubescence
color	dark green	greenish gray	yellowish green
size of leaflets	7 × 12 mm.	8 × 16 mm.	9 × 24 mm.

[1]Illustr. Plant. Orientalium, **4**: 45, t. 330 (1850–1853).

[2]Oest. Bot. Zeit. **44**: 66, 98 (1894).

[3]Prod. Fl. Pen. Balcan. **1**: 770 in Fedde, Rep. Spec. Nov. Reg. Veg. Beih. **30**: 770 (1926).

[4]Magyar Bot. Lapok, **12**: 163 (1913).

[5]Fl. Or. **2**: 628–629 (1872).

[6]Bot. Cent. Beih. **27**: 347 (1910).

There is no more difference, if as much, between *S. Prodanii* and *S. alopecuroides* from the neighborhood of the Bosphorus as between *S. alopecuroides* from Asia Minor and *S. alopecuroides* var. *tomentosa* from Afghanistan. But in the latter case, there is a full set of intermediate forms from the intervening territory while in the former the intermediates which once undoubtedly existed have long since disappeared. In the 250 miles between Babadag and the Bosphorus no sophoras of this group have been collected. The differences between *S. alopecuroides* and *S. Prodanii,* though slight, include leaf texture and color as well as pubescence and general size. For this reason *S. Prodanii* is put forward as a distinct species rather than as a variety of *S. alopecuroides*.

Sophora Prodanii undoubtedly originated as a semi-glabrous variety on the westward edge of *S. alopecuroides*. A large number of Balkan species represent westward extensions of Asiatic species, or find their closest relatives in the Asiatic flora. "It is necessary to bear in mind . . . that the Hungarian and Roumanian plains were covered with the waters of the Sarmatic and Pontic seas and lakes until relatively recent geological times (and) that the Bosphorus is no wider than a broad river . . . It follows . . . that migration on a wide front between the lowlands of the Balkan Peninsula and those of the north has been possible for land plants only since the end of the Tertiary period and must for the most part have been in one direction—northwards—as the Sarmatic and Pontic waters dried up; that migration along the northern part of Asia Minor into the Balkan Peninsula is geographically feasible and has been even more so in past geological periods."[1]

The persistence of *S. Prodanii* in this one isolated station in the Dobrudja is to be explained by the geological history of the Babadag mountains. These low mountains (or hills) are of very great age and though low in elevation have persisted for a long time as a land mass, remaining above the waters of the Sarmatic and Pontic seas and lakes. "It is safe to assume that they formed a refuge for relatively old types of plants and to this fact is due the richness of the Dobrudja in Tertiary relicts." (Turrill. loc. cit.)

To the question as to whether *S. Prodanii* evolved its distinctive characteristics before or after its separation from the sophoras of Asia Minor, the present day differentiation within the latter suggests an answer. Not only is there a progressive reduction westwards in size and pubescence from Central Asia to the Bosphorus but the same tendency can be seen within Asia Minor itself. The specimens of *S. alopecuroides* which most closely resemble *S. Prodanii* are from northwestern Asia Minor. These

[1]Turrill, W. B. The Plant Life of the Balkan Pen. Oxford. 1929.

facts suggest that in Miocene times *S. Prodanii* was already a well marked variety of *S. alopecuroides*. The Sarmatic and Pontic waters (Upper Miocene or Pliocene) destroyed the intervening intermediates and reduced *S. Prodanii* to a dwindling remnant in the Babadag Mountains. Within the immediate past at any rate, it has been so reduced in numbers as to undergo severe inbreeding and further divergencies from the parental type would be expected to have accumulated through the random effects of inbreeding on a small population.

Most of the plants at Babadag seemed to be infected with some gall-producing organism. The characteristic "witches brooms" produced in this way are very conspicuous in the photograph of the type specimen. Similar growths are apparently common in *Sophora alopecuroides*. Dr. W. B. Turrill has very kindly supplied me with the following list of specimens in the Kew Herbarium which exhibit the phenomenon: Nestorian Mountains and Gawan, *Capt. Garden* in 1857; Caucasus, *Prescot* in 1828; Near Tabriz, Persia, *Gilliat-Smith* in 1926; Pamir and Thian Shan Journey, *H. Appleton 190* in 1906.

In Babadag, the seeds of *S. Prodanii* were reported to be extremely poisonous. While *S. alopecuroides* has never been listed as poisonous so far as I know, there are a number of references to the poisonous seeds of other species of *Sophora*. The seeds of *S. secundiflora* Lag. are used by Mexican Indians as an intoxicant; one seed is said to be sufficient to kill a man and a half a seed produces a stupor lasting two to three days.[1] *S. flavescens* Ait. contains poisons which are made use of as insecticides.[2] The seeds of *S. tomentosa* L. yield a poisonous alkaloid. They are a common native remedy in the Philippines for stomach disorders.[3]

EXPLANATION OF THE PLATES

PLATE 123

Sophora Prodanii E. Anderson. Type specimen.

PLATE 124

A. Leaflet of *Sophora alopecuroides* var. *tomentosa* (× 7). From Stapf, s. n., collected at Schiraz, Persia, Aug. 23, 1885.
B. Leaflet of *Sophora Prodanii* (× 7). From Anderson, no. 85 (type).

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[1]Kew Bull. **1892**: 216–217; **1896**: 231.
[2]Am. Jour. Pharm. **91**: 104 (1919).
[3]Contrib. U. S. Nat. Herb. **9**: 376 (1905).